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## GUIDE TO THE PREPARATION OF MILITARY REPORTS OF A TECHNICAL NATURE

The Engineer School, Fort Belvoir, Virginia

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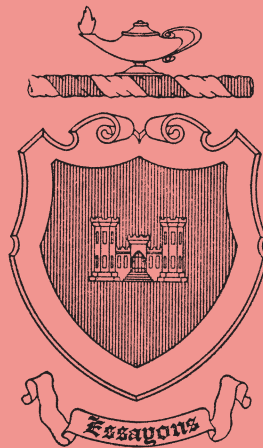
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# **GUIDE TO THE PREPARATION of MILITARY REPORTS OF A TECHNICAL NATURE**



**THE ENGINEER SCHOOL - U. S. ARMY - FORT BELVOIR, VIRGINIA**



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GUIDE TO THE  
PREPARATION OF MILITARY REPORTS  
OF A TECHNICAL NATURE

Preface

The manuscript covering the preparation of a technical report has been prepared for two reasons: first, to serve as a basic text for instructing student officers in the techniques of report writing and second, to serve as a means of reference. Student officers cannot be expected to retain in their minds all the minute details of report writing to which they are exposed during their period of school training. Considerable time may elapse after graduation and before they are called on to undertake or to supervise a technical study. If so, a cursory reading of the textual material contained herein will quickly refresh their memories; and, perhaps, serve as a guide to orient junior officers under their command.

When the text is used for instructional purposes, it is suggested that a series of coordinated situations and requirements be developed and used as practical exercises - that during the instruction, seminars be scheduled for the discussion and evaluation of individual student progress; and that only two periods, at the most, be used for conference purposes involving the entire class. Discussion concerning student reports, and the subject of report writing as a whole, should revolve around the manner in which the students, both individually and collectively, have demonstrated their ability to gather and to present in a concise form pertinent facts concerning a particular problem.

*Edward E. Pickard*

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PREPARATION OF MILITARY REPORTS  
OF A TECHNICAL NATURE

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1. THE PROBLEM

"An Engineer who is inarticulate is quite as useless as one who is professionally incompetent ..... The inability of an engineer to communicate his ideas clearly, concisely, and accurately will not only handicap him in many ways but may even affect detrimentally the work of others with whom he is associated. His ability ... to ... write with coherence and force is a professional and social accomplishment the value of which no thinking engineer will deny."<sup>1/</sup>

By the same token, your problem as an engineer staff officer is to learn how to set forth in writing certain conceptions you may have, whether they concern facts, concrete mental images, or abstract ideas. Your mission is to transmit these conceptions to the minds of your associates as accurately as possible and in as few words as possible.

The problem of knowing what to write about will seldom trouble you. As a general rule your subject will be dropped in your lap in the form of a request or a directive from higher headquarters.

Directives for the preparation of a technical report or staff study are generally prepared as memorandums (refer to Figure 1). They may contain any or all of the following points: (1) a short statement or description of the problem, (2) any assumptions to be made, (3) items requiring special attention, and (4) a statement that the study is to be made.

Disposition forms, discussed in the following paragraph, are also used at times within agencies of the Department of the Army for initiating action on a special study. This form (refer to Figure 2) is designed as a convenient means of communication between individuals and agencies within the Headquarters, Department of the Army, or within any subordinate Army Headquarters. When addressed to more than one individual or agency within the respective headquarters all addresses are shown on each copy of the communication. This practice informs each recipient immediately

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<sup>1/</sup> Watt, H. A. & McDonald, P. B., The Composition of Technical Papers (N. Y.: McGraw-Hill, 1925), pp 3-6.

OFFICE, CHIEF OF ARMY FIELD FORCES  
FORT MONROE, VIRGINIA

ATTNG-33 352

14 Aug 52

SUBJECT: Method of Evaluation - Army Service School

THRU: Chief of Engineers  
Department of the Army  
Washington 25, D. C.

TO: Commandant  
The Engineer School  
Fort Belvoir, Virginia

1. It is desired that The Engineer School institute a system . . . for determining the efficiency of the performance of its mission. The purpose of such a system will be to provide assurance that qualified graduates of the several courses are being produced in the shortest practicable time.

2. In making such an analysis it is desired that the following procedures, as a minimum, be included:

a. . . . Orientation . . . to the student as to the procedures utilized by the school for self-evaluation. . . .

b. Development of a questionnaire to be completed by representative graduates of each course (minimum of 20%) upon completion of the course. . . .

c. Development of a questionnaire to be sent by the school commandant to selected graduates of each course approximately four (4) months after completion of the course. . . .

3. The Engineer School should incorporate such self-evaluation measures as are presently in effect with the procedures outlined in paragraph 2. . . .

FOR THE CHIEF OF ARMY FIELD FORCES.

/s/ A B Chatham  
/t/ A B CHATHAM  
Lt Col AGG  
Asst AG

Fig 1 -- A Sample Memorandum

DISPOSITION FORM		SECURITY CLASSIFICATION - UNCLASSIFIED	
FILE NO.	SUBJECT		
CSGID, D3 626-5	Transfer of certain arms munitions, and equipment to the . . . . .		
TO Chief of CmlC	FROM G-4	DATE 11 Feb 54	COMMENT No 1
		Lt Col Brown	52121
<p>1. By letter dated 9 Feb 54, Board of Commissioners, . . . . , requests transfer of certain equipment from the Federal Government to the Metropolitan Police Department.</p> <p>2. It is desired that this office be advised as follows:</p> <ul style="list-style-type: none"> <li>a. Availability of items pertaining to your technical service.</li> <li>b. Correct nomenclature of items.</li> <li>c. Classification of items (expendable or nonexpendable).</li> <li>d. Pertinent remarks relative to the transfer of items.</li> </ul> <p>3. It is requested that the foregoing information be submitted to this office by 1200, 15 Feb 54.</p>			
		/s/ T. B. Larkin /t/ T. B. LARKIN Lieutenant General, GSC Assistant Chief of Staff, G-4	
Incl 1			
List of Items			
TO CCmlO	FROM CSigO	DATE 12 Feb 54	COMMENT No 2
		Col Smith	4123
<p>1. Prepare a report in accordance with requirements listed in par 2 above, including pertinent comments on the effect of such a transfer on supply group requirements for the Maintenance Branch, Disposals Section, and the Distribution Branch.</p> <p>2. Suspense date 14 Feb 54.</p> <p>FOR THE CHIEF SIGNAL OFFICER</p>			
		/s/ R. A. Smith /t/ R. A. SMITH Executive	
Incl 1			
List of Sig C Items			

Fig 2 -- A Sample Disposition Form



as to the other agencies who possess the same information. In effect, it establishes the channels through which coordination in the preparation of the report can be effected.

The disposition form is never forwarded to an individual or agency outside the headquarters in which it originates. It is never transmitted by agencies in Washington and vicinity to the field and vice versa. Its principal use is for chain correspondence such as:

- a. originating action on a problem;
- b. requesting information about which a written reply is desired; and
- c. recording comments, concurrences, or other actions regarding the problem in question.

In every instance, however, the memorandum or disposition form should reflect the office to which it is directed, the subject, and an ending showing the office of origin.

The first question that should arise naturally in your mind when you receive the directive is, "What specifically is expected of me?" Relax a bit and think it over. First, look at the assignment from the viewpoint of the person requesting the report.

Most problems requiring decisions by higher level commanders are so complex that an analysis of each phase must be prepared beforehand by a member of the staff. You are one of these staff officers. Your commander probably gave you the task because he has confidence in your ability to obtain and to interpret the information he needs. He needs this information in order to make a sound decision on some matter to which your report relates.

Consider, also, the factor of time. The higher the level of command the greater are the demands on a commander's time. He has none to waste in trying to decipher redundant and ill-conceived reports. He wants the facts and he wants them as briefly and as quickly as possible. On the other hand, you, too, have no time to waste in either preparing your original report or in reorganizing and rewriting a report you have already written. The facts should be presented concisely, logically, and accurately the first time.

Your problem is to prepare a report that will meet the above three requirements.

To economize on time, and to assure yourself that your report will provide the desired results, it is mandatory that you develop a plan of attack before you fire the opening gun. The most outstanding difficulty experienced by many officers who are faced with the problem of writing a report is their failure to define their objectives. They "take-off" before they have a firm idea as to where they are going. Consequently, the report concerning where they have been is just as rambling as the procedures followed in getting there.

Check yourself at the outset by actually phrasing your problem and giving your report a tentative title. Work until you can state your problem in one sentence. Then develop that sentence into a brief paragraph, explaining terms, noting exceptions, and otherwise clarifying in a nutshell. You will have something to guide you. Think, then, before you begin and determine in your own mind the answers to the following questions:

Q: What Type of a Report Am I Called on to Prepare?

In general, all reports and special studies may be classified under one of two major headings. They are either (1) reports of a primary nature, setting forth the results of original research and experimentation by the author; or (2) reports of a secondary nature, in which the writer confines his study to the gathering and interpretation of data already compiled in one form or another.

An example of the former would be a study to Develop A Scale of Basic Motor Abilities for Selection and Assignment of Personnel. A study of this nature would require the writer to conduct a series of controlled experiments in order to supply the basic data for his report.

Generally, reports required of you as a staff officer will be of a secondary nature. This means that your data will consist mainly of facts gleaned from sources over which you have little

or no control. You do not make the facts, but facts can be interpreted in various ways. Even a secondary report requires imagination and creativeness. Your job is to organize these facts, analyze them, draw conclusions based on them, and at times, to prepare recommendations for action by higher authority.

Having fixed clearly in your mind the basic type of report required of you the next question to be considered is:

Q: How is My Report to be Organized?

The form of your report is important because it contributes to orderliness and clarity. SR 310-110-1<sup>1/</sup> sets forth the use, style, and form for routine orders, bulletins, circulars, and memorandums. SR 340-15-1<sup>2/</sup> establishes the use, method of preparation, and form for military letters, non-military letters, memoranda for record, and various inter-office forms; and FM 101-5<sup>3/</sup> prescribes the standardized staff study procedures and regulations.

However, special reports are frequently required for which the standardized procedures are not appropriate. These studies must be undertaken by members of the staff in order to provide the commander with an accurate analysis and a recommended solution to a particular problem. The latter situation is the one contemplated in this particular discussion.

It is not intended that the following procedures shall supersede or modify in any way the standardized procedures prescribed in either SR 310-110-1 or SR 340-15-1. It should be noted, however, that the developmental nature of the recommended form provides a logical, step by step procedure for the preparation of any report,

- 1/ SR 310-110-1, Military Publications (Wash., D. C.: Adj. Gen. Office, 1 March 1951).
- 2/ SR 340-15-1, Correspondence (Wash., D. C.: Adj. Gen. Office, 1 May 1951).
- 3/ FM 101-5, Staff Officers Field Manual (Wash., D. C.: Supt. of Documents, July 1950).

regardless of the final form in which it may be presented. Briefly, it is a preliminary working outline similar to that illustrated in FM 101-5.<sup>1/</sup> This outline should be constructed by the report writer before he begins to assemble his facts. It will enable him to establish his objectives and to set a compass course whereby the objectives might be achieved. It begins with a statement of the problem; followed in turn by assumptions, facts bearing on the problem, discussion of the facts, conclusions drawn from the facts, and recommendations based on the facts.

The next question to be considered before you begin to write is:

Q: What Should My Readers Expect to Find in My Report?

Your reader has a right to expect to find your problem analyzed in a simple and direct manner. He expects to find it defined early in your report. State your problem as a mission, and word it clearly so that there can be no misunderstanding as to its purpose. This will help you as you write and will also help your reader as he reviews your report.

a. Statement of the Problem

Defining your problem is not the same as selecting a field in which you are to work. First, you select your field and then you limit your problem within that field. If several problems are to be considered each should become the subject of a separate study. For example, suppose you have received either a written or an oral directive to prepare a report on Arctic Airfield Construction. As you probably know from experience, this is a highly specialized field. It involves many problems, each of which may become the subject of a report.

For your report you may be required to show some of the deficiencies found in materials used in such localities.

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<sup>1/</sup> Op. Cit., pp 260-263.

However, even this topic is rather broad for a single investigation and report. There are probably hundreds of items used in Arctic Airfield Construction. In addition there are many different climatic and soil conditions found in the Arctic regions. For you to attempt to combine all these factors into one report might lead to confusion, both in your mind and in the minds of your readers. It may be necessary for you to examine the overall problem in order to get started, but limit and define the nature of your report as soon as you are able. Do this under the heading of "Statement of the Problem."

b. Assumptions

In some cases it may be necessary for you to make certain assumptions in order to create the foundation on which your report is built. An assumption is a condition which cannot yet be established as a fact but which, in the best judgment of the writer, will be true when the study is complete. For instance, in your study of Arctic Construction you may have to assume that certain transportation problems are capable of solution; that the equipment required to work these materials will be capable of operating under Arctic conditions, or that the materials themselves will be available in the quantities required for the project in question. Assumptions should not be merely conjectures. They must be based on realities. They are used only whenever facts, decisions, or policies cannot be definitely stated. If used, the reader has a right to know them in advance. Without them his ability to arrive at a reliable evaluation of your report is rendered nil.

c. Facts Bearing on the Problem

The third section of your report should deal with the data you gather. Some writers make the mistake of setting out to prove a premise and then rigidly adhering to their ideas, even when the facts they uncover show the original premise to be wrong. On the other hand, if you are disturbed by each bit of new evidence and keep changing your point of view, your writing will become an empty gesture. After you have begun to gather your facts, you will show the quality of your judgment by the changes you make in your outlook as you proceed. Look upon the facts you uncover in the same way an impartial judge examines all the evidence before he makes his

decision. Your report will have no meaning unless it is based on concrete evidence.

Essential facts bearing on the problem should be enumerated. These must be unimpeachable facts and not speculations or eventualities. Inventigate any comparable reports that have previously been written. Use facts digested by other writers, but when facts are extracted from other reports, regulations, or directives appropriate references to the source should be indicated. If you use confidential or secret material your entire report must be so classified until released by competent authority.

#### d. Discussion

The objective of a technical report is to present both a factual and an analytical summary of a particular problem. It must insure that the reader obtains a clear picture of the reasoning and evaluation that leads to the conclusions you draw. Each essential fact relating to the problem should be analyzed and evaluated in your discussion. If organized in logical sequence, this type of discussion will permit the reader to draw his own conclusions as to the soundness of your recommendations.

The discussion stage of work is a crucial one. You have most of your facts before you in a form to which you can readily refer. Your ideas are not buried in language. Take away all non-essentials and reduce your reasoning to a simple equation. Consider not only the evidence you have but also the evidence you do not have. Examine your facts in proportion to the total problem. If you use inductive reasoning - that is, argue that what has happened in a number of cases is true generally - be sure that you state how many cases you have examined, or that have been examined by your source of information. Then, when you have arrived at a generalization check back on it by making a few deductions to see if they sound reasonable. Sort and re-sort your facts until they fall into a logical pattern.

#### e. Conclusions

From the time you undertake to prepare your report until the final word is written you will find yourself forming tentative conclusions. This situation will be particularly true during the discussion phase. As you analyze each set of facts your mind will tend naturally to draw conclusions. At this point you will be faced with two alternatives - either to state your conclusions during the discussion phase, as they pertain to each portion of the discussion, or to place them under a separate heading in your report.

From your own viewpoint the former may be easier to accomplish. You have analyzed each set of facts in detail and formulated your partial conclusions based on your facts. You are, therefore, in a good position personally to pick out your conclusions quickly from your discussion as you read through. But, think of your reader. He is interested in your reasoning, yes; but he is also interested in the final outcome - your conclusions - and he wants these presented logically and concisely. If he doubts their validity he can refer to your discussion - if not, then he has what he needs in a nutshell. Consequently, it is better to list the conclusions logically under a single heading, showing the resultant effect if adopted. When listing conclusions keep this thought in mind, "Any summing up which repeats the details of the discussion is an insult to the intelligence of the reader." <sup>1/</sup>

f. Recommendations

Recommendations are intended to provide a specific and practicable solution for the problem outlined in the original premise. Broad general terms are not effective. The language should be couched in specific terms that are clear and concise. Your recommendations must be justified by your conclusions, and the recipient must be afforded the opportunity to complete action on the recommendations when submitted. If a letter, memorandum, message, or directive is required to implement the recommendation, a draft of the implementing communication should be included as an annex to the report. When this is done the commander needs only to approve or disapprove. If he approves, immediate action can be taken to put the recommendations into effect.

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<sup>1/</sup> Watt, H. A. & McDonald, P. B., The Composition of Technical Papers (N. Y.: McGraw-Hill, 1925), p 49.

## 2. COLLECTING INFORMATION

The discussion thus far has been designed to give you an overall view of your objective. However, there are a number of steps that must be accomplished before your report will emerge as a finished product. The first of these deals with the work of collecting and assembling information. Your best equipment for this purpose is your mental attitude. Knowledge is important. System is important. A meticulous attention to detail is important. But all these assets are really part of an attitude of mind. Even a modest bit of writing can be either a fascinating experience or sheer drudgery. It all depends upon the way you go about it.

If you already have some knowledge of your problem start by making a tentative outline. If not, it would be well for you to make up a working bibliography and do some research first. One reference often gives you a lead to others and these, in turn, may suggest more.

When you look for your first references you should have in mind getting a bird's eye view of your problem. Start by checking the numerous military publication indexes published by the Adjutant General's Office, Washington, D. C. These indexes will be found in the SR 310-20 series. For instance, SR 310-20-3 is an index of all Field Manuals published; SR 310-20-4 is an index of all Technical Manuals, and so forth. Additions to these Special Regulations are made approximately every two months or so, to keep them up to date.

Other military sources are the guides to unpublished studies and monographs produced at such places as the Army War College, the Command and General Staff College; the National War College; and the various service schools.

If you are not already familiar with general references in the field of your study consult the Reference Section of the nearest library. Make a systematic survey of the library card catalog.

Next consult the Reader's Guide to Periodical Literature or any other magazine or newspaper index that the library may have. In journals for special fields there are often bibliographies that will give you further clues. The United States Catalog of Books in Print and the Cumulative Book Index will give you a list of all books published in the United States. Another possibility is to investigate pertinent pamphlets published by some agency of the Government. The latter publications are listed in the yearly document catalog put out by the Superintendent of Documents, U. S. Government Printing Office.



Take notes as you read. Since your findings must be accurate, do not rely on your memory for anything. Record all facts in one form or another.

It is recommended that you make out a bibliography card for each reference as you come across it. The card file reference system is especially useful for the researcher on long technical reports. For shorter ones a loose leaf notebook, tabbed in worksheet form, will serve adequately. You will most likely discard some of your first listings, but if you put down a reference accurately and completely the first time, you will save yourself needless work.

Make your bibliography cards on standard 3 by 5 inch cards (refer to figure 3). In the upper left corner, list the author's name. Follow this with the title of the publication, place of publication, publishing agency, and date of publication in the same order that you will later put the information in your footnotes. If the book is a translation, note the translator. If there is any other information about the book that you think may affect its value as a reference, include this also. In the lower left corner of the bibliography card place the library call number of the book, so that you will not have to look it up every time you wish to use it.

Author

Nelson, Major General Otto L., Jr.

Title of  
Book

National Security and the General Staff  
(Washington: Infantry Journal Press 1946)

Date and  
Place of  
Publication

Covers the development of the G/S and the W/D.  
Refers to purposes and struggles, in Congress  
and in the W/D, that have been part of the growth  
of the G/S.

Library  
Call  
Number

355.35  
N33n

Fig 3 — A Bibliography Card

For a bibliography card on a newspaper or magazine article, include the same type of information. If you are basing your study on interviews, make out a card for each interview. Include the place,

date, and reason why the person is considered an authority. A good part of your training in preparing a technical report consists of learning to handle references. Just as an experienced cloth merchant knows how to recognize high quality cloth in an instant, by the way it looks and feels, you will come to recognize the value of a reference by its author, its timeliness and the soundness of the author's generalizations.

Learning how to scan a book or an article to decide upon its usefulness is important. If you believe a reference will have value for you, survey it quickly to make certain. Read the preface. Look over the table of contents. Then check to see how recent it is, and why the author is qualified to write on the subject. Use the index and headings freely. Scan passages that may seem important to you. There is no need to read a book from cover to cover to extract what is useful. You are looking for ideas, not trying to see how many books you can read.

After you have surveyed a reference and have decided that it will be useful, begin to take notes. Keep each idea on a separate card (refer to Figure 4). In the upper left hand corner of each card write the subject of your note. This will help you to sort all the cards on one subject and to work the information under the corresponding headings of your outline. Immediately below the subject, key the title for your reference so that you can match it with the bibliography card. Then give the page where you found the idea. A good way to key a reference to a bibliography card is to assign each bibliography card a number. Then insure that each note based on that source bears the same number as the bibliography card. This procedure will also be found helpful in sorting notes and in tying in notes with particular portions of your outline. Discipline yourself until you get all the facts on a note card as a matter of habit. If you omit information, you will have to waste time later in tracking it down.

Subject	<u>Organization Charts, Misunderstanding of</u>
Key to Source	Nelson, O. L., p 2
Direct Quotation	"... It is an old saying that every officer is a qualified and self-acclaimed expert on how the Army should be set up and how the promotion system should be improved to give him a promotion. It is intriguing to draw, label, and connect with lines and arrows the rectangles which then become organization charts, though too often this is done with little understanding and regard for previous experiences. Not infrequently organizations go through the motions of periodic reorganizations that do not seem to make any real improvement; the organization chart changes but everyone continues to work in the same old fashion."

Fig 4 -- A Note Card

An important element of intellectual honesty is found in interpreting each author as he means to be interpreted. Do not read your own ideas into what an author says. If you want to add some comment of your own, put it in brackets or otherwise indicate that the idea is yours. Make out note cards for your ideas, as well as for references. Unless you write down an idea when it occurs to you, you run the risk of losing it completely. You may never be able to recall it later.

Just how much material you ought to take verbatim and how much you ought to summarize in your own words is a matter of judgment. If you come upon an idea that is crucial in solving your problem, by all means take it down word for word and check it for accuracy. If you do not plan to use the direct quotation you may still want to have the author's own words. If the passage is important, you will want to consider it several times.

If you cannot find enough secondary references on your problem you may decide to use a primary source such as, questionnaires or interviews. If you intend to make a survey, plan the whole undertaking carefully before you send out any questionnaires. Canvas only those who can speak with authority on the subject. Make your questionnaire brief and word it clearly so that it will not take too long to complete.

All that was said about being objective in your work certainly applies to the questionnaire. If you are prejudiced in your mind about the results you hope to obtain, you are apt to load your questions; that is, word them in such a manner that you influence your subject to answer in one way, rather than another. To avoid this possibility, it is wise to test your questionnaire on a few persons before sending it out. In this manner you may be able to avoid many of the deficiencies that are likely to exist in hastily constructed questionnaires. For additional information on the questionnaire technique the reader is referred to Brown, L. O., Market Research and Analysis (N. Y.: The Ronald Press, 1937).

Dispel any suspicion about your motives for making the study by carefully explaining the reason when you send out the questionnaire. If you think any of your subjects will still hold back information, ask that the questionnaire be returned without a name. If, on the other hand, you think it is necessary to identify each questionnaire with a name, have the name and address typed at the top of the sheet before it is sent out. In the event that insufficient returns are received from your original questionnaire, follow up your request. Experience has shown that you will receive

about a 10% additional response from those who failed to return the first questionnaire.

Interpreting statistical data requires specialized techniques. If you plan to build the solution of your problem entirely on statistics, you must know what amount of difference must be secured between two sets of results to make the difference statistically reliable. If you have no specialized knowledge of how to work with statistics, supplement figures with other kinds of data.

If you still wish to prepare a statistical study, analyze your methods before you start to gather your data. To review statistical methods, consult such references as: Arkin and Colton, An Outline of Statistical Methods (N. Y.: Wiley & Sons, 1949); Blair, M. M., Elementary Statistics with General Applications (N. Y.: Henry Holt, 1952); and Simon, L. E., An Engineers' Manual of Statistical Methods (N. Y.: Wiley & Sons, 1941).

A survey may be worked out on the basis of a series of interviews in place of questionnaires. Generally, you will be able to secure more information from a personal contact than from a questionnaire. If you are a willing listener you may discover angles to your problem that you never realized existed. Work out the plan for your interview carefully ahead of time. Decide what questions you need answered. During the interview be a tactful listener and questioner. If you see that note taking bothers your subject, put your pencil down and concentrate on keeping the information in mind. You can write down what you need just as soon as the interview is over. As in making out the questionnaire, be objective. Otherwise, you will influence your subject and his statements will not provide the kind of unbiased information for which you are looking.

### 3. PREPARING TOPICAL OUTLINES

An outline is a plan of action. The anonymous author of that immortal Scotch ballad, Loch Lomond, had similar action in mind when he wrote these lines: "Ye take the high road and I'll take the low road, and I'll get to Scotland afore ye."

Reports can also be prepared in several ways, but the most direct way is to outline in advance the points along the way. Write down in logical order the topics you think should be covered in order to arrive quickly at a reasonable solution to your problem. This procedure will save both time and energy and will help to keep you from traveling up blind alleys, or over-emphasizing minor details. How complex your outline needs to be and how many times you will need to revise it will depend upon the nature of your problem and the way you work best.

Begin your outline with a statement of the problem in the form of a short paragraph. Then jot down in logical order the different topics you think should be investigated. If you must handle many details in developing your study, fit the facts into your outline so that you can get a good overview of your subject; but do not go to extremes and clutter it up with so much detail that it loses its value as a guide.

Work back and forth between your outline and your notes. The former will tell you what information is lacking, and the latter will provide the information to fill the gap.

In giving you suggestions for developing outlines, it is assumed that you will use what is known as a topical outline. This is an outline in which the subject is developed logically, topic by topic, either by paragraph where necessary to insure continuity, or by a series of words or phrases which will enable you to develop and to retain unity of purpose while gathering the information necessary to complete your mission. Figure 5 is an example of a well developed topical outline.<sup>1/</sup>

An important principle to keep in mind in outlining is the principle of parallelism. All like ideas should be presented in the same way. You should have no breakdown of a topic unless there are at least two subheadings under any one heading. Beside being

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<sup>1/</sup> Additional samples of various types of topical outlines are illustrated in Watt, H. A. & McDonald, P. B., The Composition of Technical Papers (N. Y.: McGraw-Hill, 1925), pp 34-42.

Title: Air Transportability of Engineer Equipment of the Engineer Combat Battalion in the Infantry Division

1. STATEMENT OF THE PROBLEM

This study is to determine whether the engineer equipment of Engineer Combat Battalion of the Infantry Division is air-transportable and to make appropriate recommendations for any changes thought to be necessary.

2. ASSUMPTIONS

That in any future war the Infantry Division will be the basic fighting unit. That the complete Engineer Combat Battalion of the Infantry Division will be on its target by the end of Phase II of an airborne operation.

3. FACTS BEARING ON THE PROBLEM

a. Engr. Combat Bn. (Inf.) Mission

- (1) Present
- (2) Proposed

b. Organic Engr. Equipment

- (1) Present
- (2) Proposed

c. Air Transport Available

- (1) Present Characteristics
- (2) Proposed Characteristics
  - (a)
  - (b)

4. DISCUSSION

a. Analysis of Organic Equipment

- (1) Present Eng. T/A Equipment vs. Air Transport
- (2) Proposed " " " " Proposed Air Transport

b. Analysis of Methods of Loading

- (1) Present
- (2) Proposed

5. CONCLUSIONS

a. Adapability of Equipment for Air Transport

- (1) Present
- (2) Proposed

b. Desirable Changes in Engr. Equipment Design

- (1) Substitutes
- (2) Redesign

Fig 5 -- A Topical Outline

identified by the same set of symbols, all like topics should be expressed in the same grammatical form (clauses, phrases, or key words). If you do not have your phrasing parallel, revise it. Do little mechanical jobs with your notes whenever you reach an impasse in your thinking. For instance, sorting, re-sorting, and rearranging your notes will frequently give you an entirely new lead. Every time you change your working hypothesis you will, of course, have to make some revision in your outline.

The last part of the outline will be the Conclusions or the Conclusions and Recommendations, depending on whether or not you are able to translate your findings into some practical suggestions for action. If you feel that you can make recommendations, by all means do so. Your recommendations are a tangible way of showing what you have learned from your investigation.

It is well to add here a word of caution about outlines. An outline represents your plan of work. It helps you to digest your facts and to show connections, but the outline is not the paper. It is only a means to an end - a method of working toward a final solution to the problem in question.

#### 4. DRAWING CONCLUSIONS

From the time you first decide upon a problem until you finish, you are coming to conclusions. Every time you analyze a set of facts they suggest more conclusions to you. The human mind moves rapidly from a set of conditions to some kind of generalization to explain them. Do not be satisfied with incomplete answers. From time to time, as you gather information, make a survey of your findings and summarize the results mentally. Only when you are certain that you have put in a sufficient amount of time in constructive preparation, and have developed well rounded findings, should you pin yourself down to the final conclusions.

The latter stage of your work is the crucial one; not that you are expected to be more critical now than you were at the beginning, but rather because you are now in the most favorable position to be your own critic. Some persons find it difficult to realize that the human element distorts the viewpoint, and they present their solution as though it will answer every problem in the field. Do not make this mistake. Check your conclusions to be sure they are supported by the facts you have presented. Then present them in their true light and be honest about their limitations.

Do not develop conclusions from ideas not previously discussed. The only function of the conclusions is to give a bird's-eye view of the important findings. Statements that are truisms, ambiguous, or of doubtful validity should not be employed.



## 5. WRITING THE FIRST DRAFT

The most difficult part of writing is to make the start. Nevertheless, it is better to make a poor start than none at all. If you find difficulty in composing, do not be discouraged and feel that you lack the magic touch. There is no magic touch. All that is necessary is to maintain a continuity of thought. Arrange to set aside a large block of time free of any interruptions so that you can allow your ideas to develop smoothly. Your topical outline will help you to maintain continuity of thought. Assemble all the notes that you need for one section. Complete this section in one sitting. Then go on to the next section and handle it as a unit in the same way.

As you write the first draft, concentrate on ideas. Write out the draft in longhand or on the typewriter, dictate it, or handle it in any way that is easiest for you, but get your ideas in writing. Once you have them on paper you will have something tangible with which to work. Later you can revise for clarity and matters of form.

Compose as rapidly as you can and do not stop as long as you have continuity of thought. When the flow of thought is broken go back and try to pick up your main idea again.

When you are expressing your own opinion without any substantiation, make this fact perfectly clear. Whenever you think of a natural comparison or figure of speech, put it down, but avoid using any expressions that suggest emotion or bias.

The more closely you can identify yourself with your reader the more clearly can you write. Many self-conscious writers have been able to overcome their handicap by imagining that they are addressing some one person as they write. They "talk through" their explanations. If you address one reader consistently you will be surprised to find how easily you avoid digressions and long, ambiguous explanations.

References need be no problem to you at all, if you have made your plans carefully before you begin to write. Arrange in logical order on your desk all the notes that you are going to use. Put the cards that you plan to use for notes in a separate group. Then, as you use a reference in writing, identify it with a number on the manuscript and place a matching number conspicuously on the face of the note card. By following this procedure you will not

need to stop writing to make out a reference. When you have completed a topic, put all the references for that topic in one group and arrange them consecutively. The number on the manuscript will correspond with the number on the note card. Each note card will then be keyed so that full information about the source is readily available.

The use of tables, graphs, and other illustrations is often necessary to a complete and accurate understanding of a technical report. Code them in the same manner as your references. This procedure will help to speed up your writing.

To assist you in the organization of your material in pictorial form, the following suggestions have been extracted from the Technical Report Writing Manual, published by the Engineer Research and Development Laboratories, Fort Belvoir, Virginia, 1951.

#### a. Tables

The table is the first step in the analysis of experimental data. It may present general information (trends, comparisons, magnitudes, time series, etc.) or detailed information on specific tests. Tables are advantageous because they are simple to prepare, the data can be easily referenced in the body of the report, the material is in compact form for filing, and the comparison of items is much clearer than when presented in the text. To be of maximum use, the material in the table should be arranged so that the purpose of the table can be readily understood.

There are three general classes of tables -- qualitative, functional, and statistical.

(1) The qualitative table is useful for presenting descriptions and comparisons of items when no quantitative measures have been established. (Refer to Figure 6.) Although there are some situations in which a qualitative table is the only means of presenting data, it is not considered desirable in most cases. Usually, the data can be evaluated quantitatively, or incorporated in the body of the report in regular form.

(2) The functional class of table ( $y = f(x)$ ) is more useful than the qualitative type. It is often used for comparison of productive qualities of units. (Refer to Figure 7.)

(3) The statistical class of table has become particularly popular of late, and is quite valuable for indicating trends and magnitudes of data. Example: U. S. Census, Department of Labor Statistics.

Table IV. Effect of Alloying Elements in Steel				
Alloying Element	General Influence	Definite Effect	Uses and Beneficial Effects	Disadvantages
Aluminum (Al)	Deoxidizes.	"Quiets" molten steel, facilitates escape of gases.	Up to content of 0.05 percent standard remover of gases.	Excess of Al tends to cause formation of graphite.
Vanadium (V)	Deoxidizer. Gives fine-grained crystalline structure.	Deoxidizing and hardening agent. Gives high elastic and tensile strength	Spring steel and fine alloy steel (with Cr) forms clean slag.	Expensive

Fig. 6 Qualitative Table

Table I. Landclearing Tests of Tractors (type OL* soil, moist)				
Tractor	Time (hr)	Area (sq yd/hr)	Production with Blades <del>Straight</del>	
			Windrow	
			Total (cu yd)	Unit (cu yd/hr)
TD-24	18.84	1092.0	2631.0	139.5
HD-19H	5.72	888.0	780.0	136.0
D-8	24.58	778.0	1583.0	64.5
B-11	16.50	443.0	804.0	48.7
C-42	21.92	113.5	597.0	27.2
Note: Undisturbed area contained vegetation, brush, and trees (6-inch maximum diameter, 2-inch average), and when worked was windrowed on one end.				
*Soil type according to Casagrande system, Chapter 11, TM 5-255.				

Fig. 7 Functional Table

A few standard rules and practices for tabulating data have been adopted by reports writers, and these should be carefully considered when preparing the tables for a report. They are:

(a) A table should be used for material requiring three or more columns.

(b) Material should be arranged in order of either decreasing or increasing values; that is, the unit showing greatest production would be listed first; the least production would be last.

(c) Column headings should be placed horizontally across the page. The left hand column usually contains numbers, items, or conditions that have been selected to bring out a definite point. These items should be related to each other in some manner and may be referred to as the independent variable, or the "given" part of the problem. Other columns contain the dependent variables.

(d) When the information in each successive column is dependent on the preceding columns, the table is accumulative, and the most significant data should be in the extreme right column. When the individual columns contain data which are not related, the material should be grouped in the most logical order.

(e) Tables that attempt to show several comparisons should be avoided. When several comparisons are to be noted, break down the material into separate tables and identify the main conclusion in each table by a descriptive title. Unless the data are necessary, in detail, for supporting the conclusions of the report, they can usually be summarized in a smaller table, or presented graphically to better advantage.

#### b. Graphs

Graphs are designed to save the reader time and effort in appraising the relationships existing between data. They are particularly useful for comparing trends and magnitudes at a glance, and should be used whenever possible to supplement tabulated information. But if the graph is to be helpful to the reader, it must be kept simple.

There are several types of graphs that are quite useful for presenting data in a technical report. They are sometimes classified as (1) reference, (2) analytical, and (3) illustrative.<sup>1/</sup> The reference graph presents a set of given facts; the illustrative graph

<sup>1/</sup> William C. Marshall, Graphical Methods (N. Y.: McGraw-Hill, 1921).

indicates possible relationships existing among certain data; and the analytical graph expresses accurate relations among derived data.

Graphs may express relationships either qualitatively or quantitatively. The aim of the qualitative graph is to compare relative magnitude and trend. It does not give an accurate figure for a comparison of the variables but only an approximation. The quantitative graph allows the derivation of accurate quantities. It is often used as a working tool for making computations as well as comparisons.

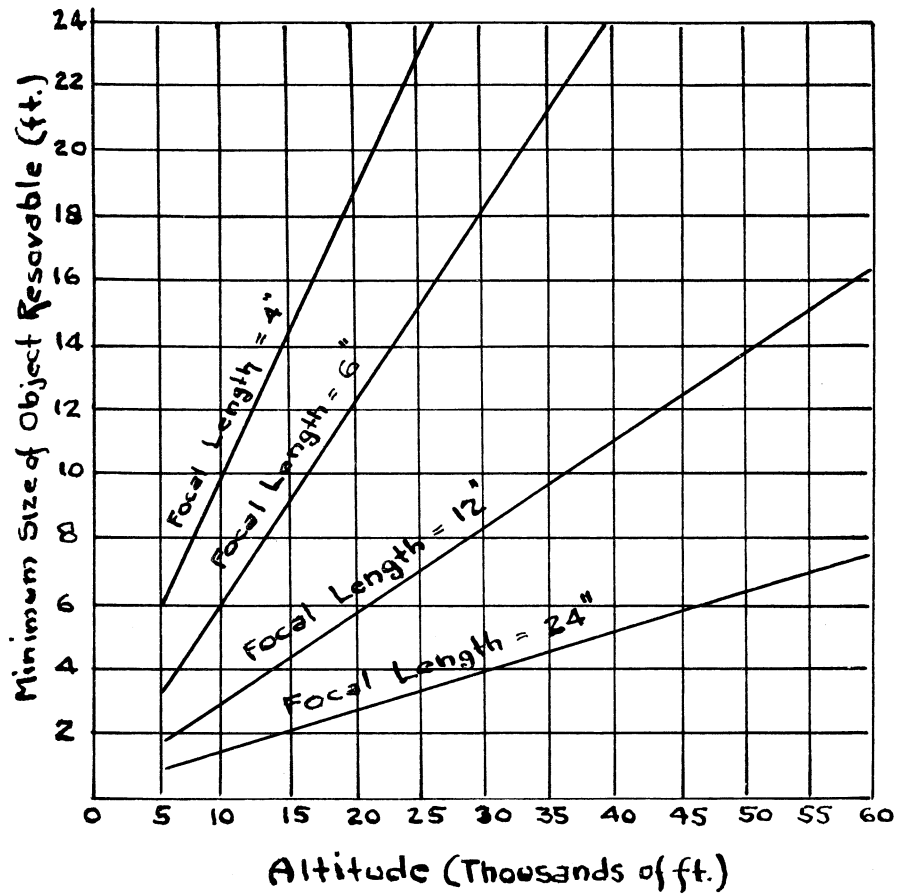
The line graph (Refer to Figure 8), is perhaps the most commonly used for quantitative values, but the bar graph and the diagram graph (Refer to Figure 9), can sometimes be used to advantages. Line graphs show the quantitative relationships existing between two or more variables and are plotted on either arithmetic, semi-log, or logarithmic paper. Any graph is easier to follow if the curves approach a straight line. The type of coordinate paper should be selected with this thought in mind. Arithmetic paper should be used for plotting simple linear relationships; semi-logarithmic paper for comparison of data that varies widely in quantity; and logarithmic paper for all numeral values related by multiplication, division, exponential powers, or roots.

When preparing the graph for inclusion in a report, the following suggestions may be helpful.

- (1) Make the title caption as clear and complete as possible. It should describe accurately the purpose of the graph.
- (2) Label the coordinate axes, and indicate the subject and the unit of measure on each.
- (3) Insert the dimensional unit in small letters in parentheses under the column heading.
- (4) Always include a zero line on arithmetical scales, even if a break in scale is necessary.
- (5) Show plotted points on the curve, unless the points adhere very closely to the curve.

c. Illustrations

The reader will obtain a much clearer conception of the descriptive phases of the report if effective illustrations are used



### AERIAL PHOTOGRAPHY

Fig. 8 Quantitative Values Illustrated on a Line Graph

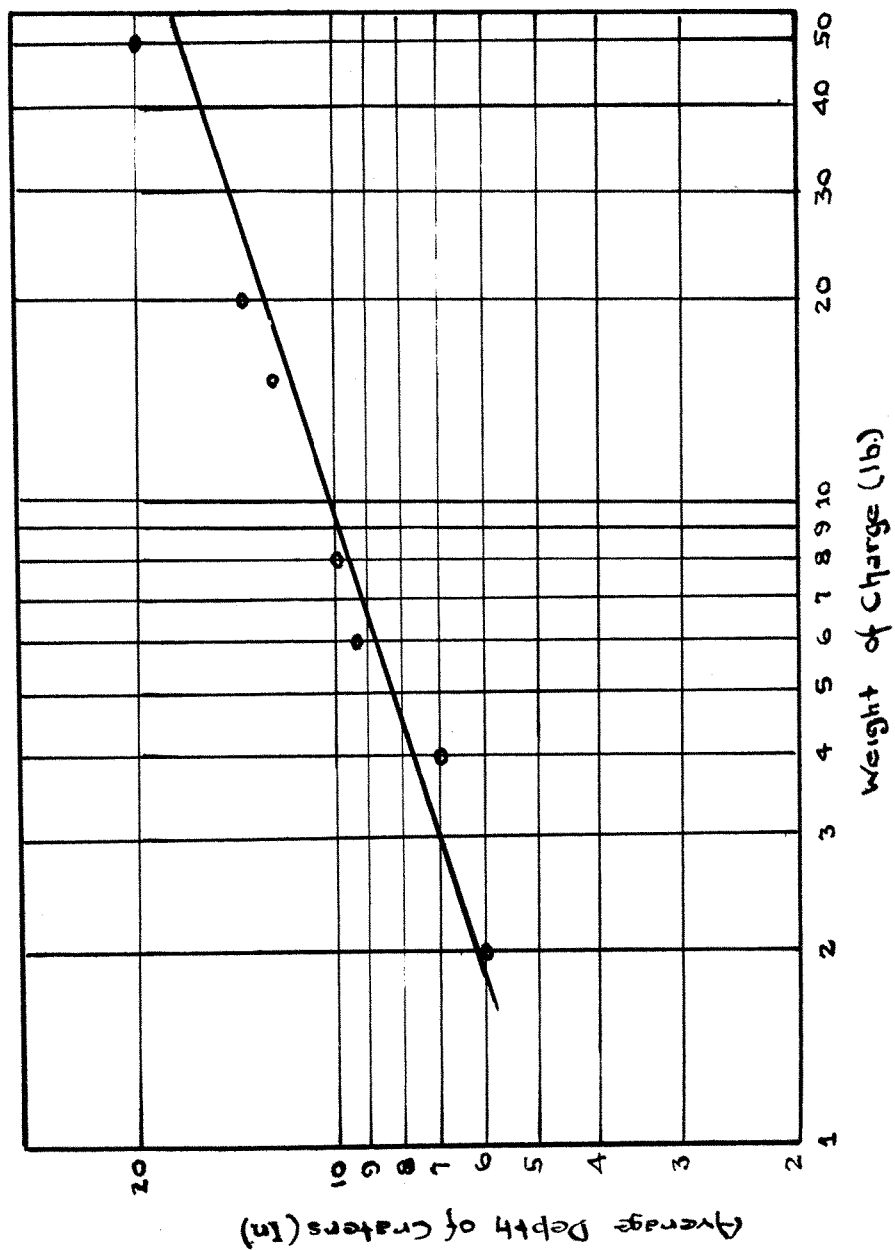


Fig. 9 Quantitative Values Illustrated on a Diagram Graph

to support the text. Photographs or drawings are actually nothing more than a short-cut method of presenting descriptive material. They should be used whenever the objects or relationships are too complex to be described fully with words; and particularly when comparing the condition of a piece of equipment before and after a series of tests. They will show more conclusively than a thousand words the superiority of one method or procedure over another.

In selecting photographs for illustrations there are several types to keep in mind. These are:

(1) The "establishing shot" to orient the reader to the situation at first glance. For example, it might show test conditions, season of the year, type of terrain, related auxiliary equipment, and similar items.

(2) The "long shot" depicting only the item under consideration. Foreground and background are at a minimum.

(3) The "medium close-up" covering details and photographed from the same angle as the pictures previously mentioned. The purpose of this shot is to include integral parts of the main test item that are not easily seen in larger shots, such as meters, gears, and controls.

(4) The "close-up shot". This shows the main text item in detail.

Frequently a photographer can enhance the value of a report by using a series of three or four negatives to make one picture. Several negatives can be laid in by enlargement, properly masked and dodged, and the result will be one picture with much information.

The readers opinion of a report is frequently influenced by the appearance of the illustrations. Therefore, careful attention should be given to uniformity in style and presentation. All drawings and photographs should have a title describing the exact purpose of the illustration; and each illustration should have only one purpose.

Specific items in the illustrations should be identified by either capital letters, or by printing the name of the item on the drawing or photograph. If letters are used to identify specific items, a legend should accompany the illustration to explain the use of the letters. References in the report to specific items in the illustration should be by name and by reference to the figure number; rather than, item C, Figure 1. Let the reader locate the item from the legend.



After you have completed your first draft, allow a short time to elapse before attempting the second draft. This lapse will enable you to approach your work more objectively. Then, when you are ready, read over your report to see if it says what you meant it to say.

## 6. COORDINATION

Coordination should be a continuous feature of report preparation, and not viewed simply as a step to be taken after a report has been completed. You, as a staff officer, can rarely secure all the necessary information you need to reach a reliable conclusion on a particular problem without the assistance of other officers. Furthermore, you seldom can be sure that you have considered all the related aspects of a particular problem unless you consult the staff agencies concerned. No report should be considered complete until coordination has been effected with all interested agencies. Select the method that applies best to your particular problem and follow it through. Those outlined below are equally appropriate during all phases of preparing a special report.

### a. Telephone

This method is preferable to forwarding a paper through channels, especially when the problem is sufficiently simple to be readily digested by the officers with whom it is being coordinated, and particularly where speed of action is essential. While not prescribed in regulations, it is customary in Headquarters, Department of the Army, to contact informally the officers who are likely to handle the action on your report. This practice gives them advance notice of what is being contemplated, allows them to plan their work, and helps to ensure proper reception of your completed report. The staff officer who fails to observe such courtesies is likely to find it more difficult to secure cooperation from individuals or other agencies than the one who does so.

### b. Conference

The conference method is widely used in the exploration of a complex subject. It facilitates early compromise or agreement on matters which might otherwise cause dissatisfaction, and it affords an opportunity for incorporating the ideas and recommendations of the various agencies into the study while it is in draft form.

If the report is one which cannot be started without the accumulation of a large amount of related information, the writer may request representatives from other interested agencies to meet in conference. If so, an agenda should be furnished these representatives prior to the conference. In this way, various interdependent problems can be adjusted to meet the requirements of the particular situation. After the conference the final recommendations may be prepared for the formal concurrence of the agencies concerned.

c. Written

This method should be used when the study is a complicated one requiring a detailed analysis by the coordinating agencies. It may require less effort on the part of the officer preparing the report, but generally involves considerable clerical work to produce the required copies of the study. An interested agency which does not concur, or concurs with exception, will usually outline its reasons on a disposition form and attach it to the study. In such instances the officer preparing the report should include a formal consideration of the nonconcurrence in the discussion portion of his report.

## 7. MAKING THE SECOND DRAFT

The object of your second draft is to begin the organization of a technical report for others to read. Check your first draft carefully for the principles of good composition. The first of these principles is unity. Follow the plan as developed by your topical outline and keep your objective in mind at all times. The second principle is coherence. Avoid the indiscriminate grouping of material and develop a logical transition from one thought to another. Emphasis is the third principle. The beginning and ending of a report are prominent positions. Do not spoil them with a fumbling introduction and faltering conclusions; and while you are about it consider the matter of brevity. The latter factor is especially important in military writing - in fact, so important that supporting appendixes should be used wherever possible to enable the body of the report to be kept brief.

Examine the main headings and subheadings in your topical outline to insure that each is descriptive of the material you think should be contained therein. These, in effect, represent sections of your report. Then begin to work on the paragraphs within the sections. To save time in making your revision, use paste and scissors. If there is one paragraph on a page that needs reworking, cross out this paragraph and paste the revised paragraph in its place.

Translate technical specifications and facts into plain English and avoid the improper use of military terms. If your readers will be Army personnel, the terms set forth in SR 320-5-1, Dictionary of U. S. Army Terms,<sup>1/</sup> should be utilized. In joint formations only the terms in the Dictionary of United States Military Terms for Joint Usage<sup>2/</sup> should be utilized. When in doubt use only terms of accepted American English. The test of good diction is the effectiveness of the words employed. Each should convey the precise meaning intended.

A number of excellent suggestions for insuring that your writing conforms to the standards of good English and established usage will be found in the G. P. O. Style Manual published by the United States Printing Office, Washington, D. C., 1953. Extracts for your guidance in completing the second draft are reproduced in Appendix I to this text.

<sup>1/</sup> SR 320-5-1, Dictionary of U. S. Army Terms (Washington, D. C.: The Adjutant Generals Office, 3 August 1950).

<sup>2/</sup> SR 320-5-5, Dictionary of U. S. Military Terms for Joint Usage (Washington, D. C.: The Adjutant Generals Office, April 1953).

## 8. PREPARING THE FINAL DRAFT

### a. Writing

When writing the final draft play down your outline. It has already served its purpose and should become secondary to the ideas presented in the text.<sup>1/</sup> Your first draft filled in your outline with ideas and the second draft clarified these ideas. Your final draft is for the purpose of insuring continuity of expression and fact. To speed up the work of making the final draft it is suggested that you take one item at a time and concentrate on this throughout the report. For example, check all topic sentences first. Where the text is difficult to read, reorganize it. When two short sentences are adjacent and contain the same subject, compound them into a single sentence.

Check for use of long sentences or complicated grammar, failure to use short compact paragraphs, unemphatic paragraph beginnings, the use of general rather than concise words, and for the lack of dignity of expression.

Next, check for the excessive use of favorite words or phrases. For example: such words as "however", "nevertheless", and "therefore"; and such repetitive phrases as "generally the squad leader does this" and in the next line, "generally the battalion commander does that".

Avoid message book style. Do not omit the articles (the, an, a) without a reason. Where applicable, articles add to the clarity and readability of any text. It takes more time to interpret a series of omissions than it does to read the words themselves—and the omission of such words often results in incoherence.

Next, check the text for spelling, use of capitals, and correctness of the numerals. Check your illustrations to insure they are correct; and finally, check the references and footnotes to be sure they are properly keyed.

If your report is being prepared for publication as a military text, the suggestions contained in Appendix II, regarding the preparation of your illustrations, should be followed. These suggestions have been digested from the Guide for the Preparation of Illustrations, published in pamphlet form by the Department of Training Publications, The Engineer School, Fort Belvoir, Virginia: 1953.

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<sup>1/</sup> Academic Dept. Memo #47, Readability of Training Literature, The Infantry School (Fort Benning, Georgia: 10 June 1948).

b. Arranging

(1) A title page should be inserted before the statement of the problem. The title page should include these items in full capitals: title of paper, the author's full name and branch designation, and month and year. All this information should be arranged neatly on the page.

(2) A preface is optional. Whether you will wish to include one will depend upon whether you have some personal experience that you wish to make known, or whether you have received special help not acknowledged in your footnotes. A preface is that part of a report where the author steps out of his formal treatment to address the reader directly and to give him information that he will not find in the body of the report. Remember that the preface is not the introduction. You do not define your problem in the preface but in the introductory section, which is an integral part of the paper.

(3) In your table of contents list all headings included in the paper. Type the main section headings in full capitals. Line up the subheadings in a neat fashion and type them exactly as they appear in the body of the report, except that you do not underline them. Be sure that your page numbers are listed accurately. Refer to the table of contents for this guide as an example.

(4) The statement of the problem always begins on page 1, but the number is never placed on the page. If you wish to number the preliminary pages, use a small Roman numeral. The title page is page i but the number is never placed on it. If you include a preface, it will be page ii and the table of contents, page ii or iv. If an appendix is included, it is numbered with small Roman numerals beginning with i again.

(5) Each main topic heading should be typed in capital letters. If you must break this heading or other main headings, break the words where the best for ease of reading. The second set of headings should be indented five spaces from the left margin, typed in initial capital letters, and underlined. If one of these headings has to be broken, the second part is single spaced. The third set of headings is typed in initial capital letters but not underlined. These headings are indented an additional four spaces from the left margin. The fourth set of headings should be underlined and typed in lower case letters with one initial capital. These headings should be indented an additional four spaces. If you find that you need more than four sets of headings in the paper, you probably need to do more work with revising the topical outline.

(6) The body of your report should be double spaced. Quotations four or more lines in length should be indented and set off from the rest of the text by single spacing. Footnotes are also single spaced.

(7) Footnotes cause most researchers far more concern than they should. If you have taken down the information accurately on your bibliography card it will be a simple matter to rearrange it in good form. If the footnote is the normal book reference, such as will concern you, copy the information in the same order that you have it on the bibliography card. All you need to do is pick up the page number from the note card.

Arrange all book references according to the following standard guide:

- (a) The author's last name is put first, followed by his given name or at least two initials to identify him.
- (b) A comma is used to separate the author's name from the title.
- (c) The title is quoted exactly and is underlined.
- (d) No punctuation intervenes between the title and facts of publications except parentheses.
- (e) The facts of publication are inclosed in parentheses. The place comes first, followed by a colon; then comes the agency responsible for publication, set off from the date with a comma.
- (f) A comma separates the second parentheses from the page number or numbers.
- (g) A period is used to show the end of the footnote.

Example:

1/ Nelson, Major General Otto L., Jr., National Security and the General Staff (Washington: Infantry Journal Press, 1946), pp 23-25.

The same basic form is followed in all published report references. A published report is underlined just as the title of a book is. In addition, the agency responsible for the report is mentioned. Otherwise the reference is the same as that for a book.

Example:

4/ Sickness Absenteeism Among Male and Female Industrial Workers  
During 1944, a report prepared by the U. S. Public Health Service  
(Washington: Government Printing Office, 1945), p 6.

Titles of magazine articles and unpublished reports are quoted instead of being underlined. The name of the periodical in which the article appeared is underlined, followed by the volume number, the date in parentheses, and the page numbers:

Example:

6/ Altmeyer, A. A., "Re Manpower", American Federationist, XLIX  
(August, 1943), p 7.

To help you in handling your reference problems the following list of abbreviations is given you as a guide:

ch ii and iv	— Chapters II and IV
ed.	— edition or editor
5 f.	— page 5 and one page following: i.e., 5 and 6
5 ff.	— page 5 and more than one page following
<u>ibid.</u>	— in the same place (used to refer to the work previously quoted when no other reference intervenes)
<u>op. cit.</u>	— in the work cited (used to refer to a work which has already been cited in its complete form)
p 7	— page 7
pp 10-12	— pages 10 to 12 inclusive
<u>passim</u>	— here and there in the work cited

(8) If a table you wish to insert is too long to complete on the page, fill out the remainder of the page with straight text and put the table on the page immediately following that on which it is referred to the first time. Number the pages just as you do the other pages. If your tabular material is bulky, include it as an appendix. If there is more than one table, and the tables are at all comparable, number each table with an Arabic number as Table 1, Table 2, etc. Then, after the number of the table, place a descriptive caption so that the reader can follow the data without difficulty. Directly above each column of figures put a descriptive label.



## 9. PREPARING THE ACTION PAPERS

### a. Memorandums for Record

Whenever a technical report or a staff study has been prepared for forwarding to another office, a Memorandum for Record in the form of a Summary Sheet (refer to Figure 6) should be prepared by the action officer for retention in the files of the action agency. In instances where a technical report is being forwarded to the Office, Chief of Staff, or to the Adjutant General, a copy of the Summary Sheet must accompany the completed study.

A Summary Sheet prepared in a general or special staff division is routed directly to the Chief of Staff, and one prepared by an administrative or technical service is routed to the Chief of Staff through the general staff division having primary interest in the subject matter under consideration.

The Summary Sheet permits the action officer's supervisors to make an intelligent review of the action taken without having to read the entire file. It becomes particularly important in instances where further action may be required at a later date. It includes a brief summary of the subject and of the directives and memoranda initiating the action; a statement of conferences held and with whom; the gist of pertinent remarks made by interested agencies, including what concurrences and non-concurrences were received; a summary of telephone conversations; and reference to any other event leading to the recommended solution to the problem.

### b. Completing Staff Action

When a staff officer has taken all the steps required for the preparation of a technical report, he will have made an analysis of the problem through study, research, and consultation with other officers; reached a decision which he has coordinated with all other interested agencies; made every effort to secure full concurrence from each interested agency; and written the study in final form, together with any necessary orders, letters, or instructions for placing the recommendations into effect. Only when the staff officer has his study complete, and is willing to stake his professional reputation on the soundness of the conclusions and the recommended action, is he ready to forward his report. His work is complete if all that remains to be done on the part of the commander is to indicate his approval or disapproval. The commander should be able to make the views presented in the study his own views simply by signing his name or by dispatching papers that have been signed by him.

TO	P & A	SSP	APPROVAL	OFFICE OF PREPARA-
		P & O	SIGNATURE	TION CONG LIAISON
1	ID	2 CHIEF OF STAFF		BR, LLD
		SECRETARY OF THE ARMY		GRADE-SURNAME TEL.
FILE NO.	SUBJECT			Maj Smith 95387
CSLID 230.04	D/A Civilian Awards Program	DATE	20 Apr 1949	

**SUMMARY**

1. Request made of CofS by Senator Black, New Hampshire, and referred to this Office for preparation of signature of CofS, seeks information on operation of DA Civilian Awards Program together with list of Department of the Army General Staff employees who have received awards. Attached letter (Incl 1) outlines Awards Program and is accompanied by list of departmental employees who have received awards during period Jan 44 through Apr 48.

2. Information on operation of Civilian Awards Program was obtained from Civ Pers Div, OSA (Mr. Root, Extension 1040). List of employees was compiled by Management Div, OAC (Maj Roe, Extension 7218).

**RECOMMENDATION**

That the attached letter (Incl 1) be signed by CofS.

**COORDINATION**

Concur - OSA - Mr. Root, Extension 1040.  
 Nonconcur - ID - Maj Gen Smart, Extension 7734.  
 No interest - P&A - Brig Gen Penney, Dep, Extension 4260. Subject relates to departmental personnel and is of no concern to P&A.

2 Incls

1. Draft ltr to Sen Black w/incl.  
 2. Memo 16 Apr 49 to LLD from C/S

/s/ Harold M. Southworth  
 /t/ HAROLD M. SOUTHWORTH  
 Maj Gen, GSC  
 Chief, LLD

**CONSIDERATION OF NONCONCURRENCE**

Intelligence Division, Maj Gen Smart, Director, nonconcurrs in furnishing list on grounds that military security will be violated if names of ID employees are made public (Incl 3). Names of staff employees are in alphabetical order and list reveals neither organization nor function.

Added 1 Incl

3. DF 22 Apr 49 from ID  
 nonconcurring

H. M. S. (signed initials)

DA AGO FORM 520  
 1 Mar 48

Fig 10 -- A Sample Summary Sheet or  
 Memorandum for Record

## 10. SUMMARY

In the preparation of technical reports precision should be made a matter of capital concern. Both formal and informal reports must conform to facts and be free from errors. In addition, particular attention must be paid to all of the following points:

### a. Brevity

Include only the essential details in the main body of the report. Explanatory facts and figures should be included as appendixes.

### b. Clarity

Keep your objective in mind at all times. Use simple sentences and correct grammatical construction. Avoid the use of unauthorized abbreviations.

### c. Coherence

Arrange the various parts of your report logically. Avoid indiscriminate grouping of material. Emphasize your findings by a conscious arrangement of words and subject matter to make the important ideas stand out prominently.

### d. Objectivity

Bias and personal prejudice have no place in military writing. Conclusions and recommendations must be drawn from, and based on a careful study and analysis of the data presented.

### e. Unity

No more than one subject should be treated in any paper, whether it be a staff study, a technical report, an order, or merely a memorandum.

### f. Simplicity

Reading a technical report should enable the reader to find the facts quickly and with a minimum of effort. This result can be achieved by establishing a point of view, preparing an outline for accomplishing your goal, and keeping your purpose in mind as you work to fill in the details in the outline.

### g. Emphasis

The beginning and ending of your report are prominent positions. Do not spoil the effect by a fumbling introduction and faltering conclusions or recommendations.

h. Completeness

A staff study or report can never be considered to be complete until all alternative plans have been considered. The signature of the writer on a report implies that he is willing to stake his professional reputation on the soundness of his recommendations.

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APPENDIX I

Suggestions for Use of Good English

The following suggestions for insuring that your writing conforms to the standards of good English have been extracted from the G. P. O. Style Manual, published by the United States Printing Office, Washington, D. C.: 1953. They cover briefly the topics of: abbreviations, capitalization, footnotes, hyphenation, quotation marks, parentheses, articles, and numbers.

1. ABBREVIATIONS

In accordance with Army and engineering practice abbreviations when used will be written without periods. In no case, however, will clarity be sacrificed.

a. In text and footnotes, all symbols are spelled out except degrees (68° 7'2" or 68°F).

b. All reference terms in parentheses will be abbreviated as follows: app. ch and chs, fig and figs, p and pp, par and pars, and sec and secs.

c. If the abbreviation is used frequently throughout the text the term will be spelled out the first time, with the abbreviation following in parentheses. Thereafter the abbreviation alone may be used.

Examples: AGO, AT, AWOL, BM, CO, EM, FM,  
CHQ, MG, NCO, OP, SOI, SOP, T/BA  
T/O, T/O&E, ED, WO, and 31st Engr  
C Bn (specific reference).

2. CAPITALIZATION

Capitals will be used as sparingly as possible. Items of equipment and titles of military units are not capitalized.

Examples: map template M2  
engineer combat battalion  
unit construction railway bridge  
antitank mine MI

### 3. FOOTNOTES

Use numerals for footnotes. Numerals are at the end of a sentence outside punctuation and are set off by a horizontal and slanted line. They are numbered consecutively by chapter, figure, table, sheet, or the like.

Example: This is a double-double Bailey bridge.1/

1/ Double truss; double story.

### 4. HYPHENATION

Words are hyphenated to avoid ambiguity. In cases of doubt hyphens will be used only if they clearly aid understanding.

a. Use a hyphen in a series when one modifier pertains to the succeeding modifier and not to the final noun -- unless the first word is an adverb ending in ly.

Examples: 6-inch-diameter log  
12-foot-long treadway  
front-line division  
well-chosen bridge site  
57-hp motor  
2½-ton truck  
thoroughly tested equipment

b. When a common basic element is omitted after all but the last modifier, the hyphen is retained.

Examples: one- or two-man foxhole  
2- by 6- by 10-inch block  
10- or 15-foot guy line

c. Compound numbers, compound units of measurement, and complex compass directions are hyphenated.

Examples: twenty-one  
light-year  
horsepower-hour  
north-northeast

d. A compound adjective the second element of which is a past participle is hyphenated, unless the first element ends in ly.

Examples: This tank is battle-tested.  
a well-drilled squad

A soldier should be well-groomed.  
A soldier should be neatly dressed.

e. Compound civil and military titles are not hyphenated.  
Other compound expressions are hyphenated.

Examples: commander in chief  
major general  
lieutenant colonel  
attorney general  
officer in charge  
out-to-out  
center-to-center

f. Use a hyphen to prevent mispronunciation or misinterpretation.

Examples: re-treat (treat again)  
re-use

g. Use a hyphen to join a single capital letter to a noun or participle.

Examples: I-beam  
A-frame  
T-shaped

h. Use a hyphen with fractions.

Examples: two-thirds  
one-half

i. Use a hyphen with ex, self, or elect.

Examples: ex-governor  
self-defense  
president-elect

j. Do not hyphenate names of military units.

Examples: light ponton company  
water supply company

## 5. QUOTATION MARKS

At the end of a sentence, phrase, or clause, commas and periods are always placed inside quotation marks; semicolons outside.

Examples: "When a patch of some depth is required, as in repairing a crater or a 'chuck hole,' the first step is . . . ."

"The extreme safe limits of variation of center of gravity are called 'stability limits'; the extreme forward position is the 'forward safety limit' and the extreme rear position, the 'aft safety limit.'"

## 6. PARENTHESES

Parentheses belong inside the period when the parenthetical phrase is part of the sentence; outside when the parenthetical matter is a complete and independent statement. Except in references, avoid parentheses wherever possible. Rewrite the sentence, state the parenthetical fact in a separate sentence, or substitute commas.

Examples: "The soil is soft clay and silt (mud)."

"The sill should be placed flat, because bearing surface is needed more than strength in depth. (Note that this differs from the sill on a trestle bent, which is placed on edge.)"

## 7. ARTICLES

The definite article THE and the indefinite article A or AN are used in running text wherever necessary to gain smoothness. In illustrations, captions, lists, and in tabulations such as a series of steps in an operation, they are omitted wherever possible.

## 8. NUMBERS

Numbers beginning a sentence are spelled out. Numbers expressed units of measure, such as pounds, inches, hours, and the like, are written in numerals.

a. Numbers less than 10 are spelled out; 10 or higher numbers are expressed in numerals except enumerations of a hundred or less immediately preceding a compound modifier are spelled out.

Examples: The 4 buildings were built by 16 men.  
Sixteen men worked 8 hours.  
It took four men 16 days to do the job.  
with 2- by 6-inch lumber



twelve 12-inch guns  
fifteen  $\frac{3}{4}$ -inch boards  
104 81-mm mortars

b. Related numbers at the beginning of a sentence are treated alike.

Example: Fifty or sixty miles separates us from our objective.

c. Fractions standing alone or spelled out.

Examples: a quarter of an inch  
one-half inch

$\frac{1}{2}$ -inch board

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APPENDIX II

Preparation of Illustrations for Publication

The following suggestions pertain to the preparation of illustrations for purposes of publication in military texts. They have been digested from the Guide for the Preparation of Illustrations, published in pamphlet form by the Department of Training Publications, The Engineer School, Fort Belvoir, Virginia: 1953.

1. GENERAL STANDARDS

a. Original artwork for publication should be prepared in a medium that can be reproduced by photolithography without loss of detail, tone values and clarity. Illustrations requiring combination line and half-tone, silhouette, or highlight engravings on plates are not recommended.

b. Objects in illustrations should be identified in labels and captions by standard nomenclature used in technical manuals prescribing operation and maintenance.

c. A group or series of illustrations portraying several aspects of a single subject may be either line drawings or half-tones, but should not consist of a combination of each.

d. Mechanical screening is recommended as a substitute for color.

e. Symbols on drawings to be used for illustrative purposes should conform to National Military Establishment Standards for General Drawing Practices. The references listed below, published by the Department of Defense and for sale by the U. S. Government Printing Office, Washington, D. C., are recommended as source material:

- |     |                                   |               |
|-----|-----------------------------------|---------------|
| (1) | Abbreviations for Use on Drawings | MIL-STD - 12A |
| (2) | Architectural Symbols             | JAN-STD - 14  |
| (3) | Electrical and Electronic Symbols | JAN-STD - 15  |
| (4) | Mechanical Symbols                | MIL-STD - 17  |
| (5) | Structural Symbols                | MIL-STD - 18  |

(6) Welding Symbols	JAN-STD - 19
(7) Welding Terms and Definitions	MIL-STD - 20
(8) Nondestructive Testing Supplies	MIL-STD - 23
(9) Mathematical Symbols	MIL-STD -106

## 2. CATEGORIES

For purposes of cost determination illustrations may be grouped in the following five categories, beginning with the least expensive type: a. Technical Line Illustrations, b. Creative Line Illustrations, c. Technical Half-tone Illustrations, d. Creative Half-tone Illustrations, and e. Decorative Illustrations. Within each category the illustrations are further divided into three classes - simple, difficult, and complex.

a. Technical Line Illustrations. These are illustrations in which the artist renders a technical subject using the line technique. The latter does not require creation but does require developing and rendering.

(1) Simple Technical Line. Requires a minimum number of production hours; usually includes only one view and contains a minimum of labels, call-outs and lettering.

(2) Difficult Technical Line. Requires more effort to produce; may contain many labels, call-outs and lettering. Requires source material search and multiple views. May also be a combination of technical line and simple illustrations.

(3) Complex Technical Line. Requires maximum effort to produce; may contain combinations of difficult objects, labels, call-outs, lettering, complex multiple views, cut-aways, and mechanical screening. May involve complete detail renderings of complicated subject matter and combinations of technical line and difficult illustrations.

b. Creative Line Illustrations. These are illustrations for which the artist is required to do research, or select source material, and to develop, design, alter, assemble, or create an effective interpretation of a subject by means of the line technique.

(1) Creative Line, Simple. Requires a minimum number of production hours; simple to research, create and render; source of material readily available; may contain a minimum

amount of detail, a minimum number of labels, call-outs and lettering. Usually includes only one view.

(2) Creative Line, Difficult. Requires more effort to produce; may contain more detail, accurate figure drawings, many labels, call-outs and lettering. May require excessive drawing, inking, research and development, and may be a combination of creative line and illustrations.

(3) Creative Line, Complex. Requires maximum effort to research, develop, create and draw. May contain combinations of difficult objects, figures, textures, labels, call-outs, lettering, complex multiple views and cross sections.

c. Technical Half-Tone Illustrations. These are illustrations in which the artist renders an existing subject matter of a technical nature in wash medium or opaque greys; or in which subject matter of a technical nature can be photographed and retouched.

(1) Technical Half-Tone, Simple. Requires a minimum number of production hours, simple to create and render or to retouch; simple to photograph; photographs available; may contain a minimum number of labels, call-outs and lettering. Usually includes only one view.

(2) Technical Half-Tone, Difficult. Requires more effort to produce; may contain many labels, call-outs, lettering. Requires research and multiple views. May be a combination of technical half-tone and simple illustrations.

(3) Technical Half-Tone, Complex. Requires maximum effort to produce; may require excessive research design, multiple views, many objects and difficult photography. May be a combination of technical half-tone and difficult illustrations and may require extensive detail retouching.

d. Creative Half-Tone Illustrations. These are illustrations in which the artist researches, collects source materials, develops, designs, creates, assembles, alters and renders an effective interpretation of the subject matter in wash medium, or opaque grey medium.

(1) Creative Half-Tone, Simple. Requires a minimum number of production hours; simple to create and render; simple to photograph; source material readily available; minimum number of labels, call-outs and lettering. Usually includes only one view.

(2) Creative Half-Tone, Difficult. Requires more effort to produce, or retouch; may contain many labels, call-outs and lettering. Requires more research for source material, multiple views, objects and figures. May be a combination of creative half-tones and simple illustrations.

(3) Creative Half-Tone, Complex. Requires maximum effort to produce or retouch; may require excessive research for source material; may contain excessive detail; multiple views and many objects. Difficult to photograph and set up. May be a combination of technical half-tone and difficult illustrations.

e. Decorative Illustrations. These are illustrations designed for appeal to the readers' interest. Cartoons rarely lend themselves to formal use in Army publications and generally are not used or permitted. When used, they must be expertly handled, of outstanding quality and design, and pointedly functional. They should be considered only when the subject matter or treatment thereof lends itself to particular emphasis or better illustration by this method.

### 3. TREATMENT

Illustrations should be planned and executed so as to enable the reader to obtain an immediate and thorough comprehension of the subject. Each must depict a complete portion of the story and stand on its own two feet. If secondary material is included in the illustration, as an aid in presenting the primary subject, it should occupy a subordinate position.

a. Exploded views are desirable for illustrating the component parts of a major assembly.

b. Fold-over pages, double, or triple page are acceptable only for illustrations where this procedure is essential to insure legibility. This is normally limited to charts, maps and line drawings.

c. Photographs must have well-lighted subject matter, contain sharp detail and have decided contrast. The focus must be sharp and contain the full range of tones on the primary subject.

d. Line drawings should be prepared in waterproof black india ink. The lines must be of sufficient weight and properly spaced to insure good clean definition when reduced and reproduced. Pencil drawings are not acceptable as reproducible art.

e. Maps and charts should be prepared by qualified draftsmen or artists and drawn to a scale that will insure uniformity in size of lettering and figures when reduced to the size required.

#### 4. FORMAT

a. Size. Original reproducible art must be large enough to indicate clearly all details of the subject illustrated. For best results, reproducible art should normally be submitted 50 percent to 100 percent larger than the size desired on the reproduced page. For economy in engraving costs, it is preferred that the various illustrations comprising the reproducible art be designed for the same reduction. For example: all line illustrations should be submitted 50 percent larger than the reduced reproduced size. All photographs should be a minimum of 8 x 10 inches.

b. Mounting. Illustrations should be dry mounted on illustration boards of sufficient weight and quality to prevent curling. Mounting boards should be 10 x 12 inches. When large illustrations are required 14 x 17 inch mounting board should be used. When an illustration consists of several parts, each part is mounted separately unless two or more parts are to be in one cut, in which case the parts are mounted on one mount.

c. Identification. The publication and figure number should be placed in the lower right hand corner of both mount and protective cover. Stamp or print the security classification in the margin of the top and bottom center of the mount well outside the illustration area, and at the top and bottom of the outer protective cover and the back of the mount. Multiple illustrations using the same captions will be designated Figure 1<sup>1</sup>, Figure 1<sup>2</sup>, etc.

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APPENDIX III

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